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Proceedings of the Regional Peer Review of the Fisheries and Oceans Canada (DFO)-Industry Atlantic Halibut Longline Survey Design

February 17 and March 9, 2017
Dartmouth, Nova Scotia

Chairperson: Tana Worcester
Editor: Lottie Bennett

Bedford Institute of Oceanography
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006
Dartmouth, Nova Scotia, B2Y 4A2

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Foreword

The purpose of these Proceedings is to document the activities and key discussions of the meeting. The Proceedings may include research recommendations, uncertainties, and the rationale for decisions made during the meeting. Proceedings may also document when data, analyses or interpretations were reviewed and rejected on scientific grounds, including the reason(s) for rejection. As such, interpretations and opinions presented in this report individually may be factually incorrect or misleading, but are included to record as faithfully as possible what was considered at the meeting. No statements are to be taken as reflecting the conclusions of the meeting unless they are clearly identified as such. Moreover, further review may result in a change of conclusions where additional information was identified as relevant to the topics being considered, but not available in the timeframe of the meeting. In the rare case when there are formal dissenting views, these are also archived as Annexes to the Proceedings.

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SUMMARY

A regional peer review meeting was held on February 17, 2017, at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia to review the design of the DFO-Industry Atlantic Halibut Longline Survey for the southern Grand Banks and Scotian Shelf management unit (NAFO Divs. 3NOPs4VWX5Zc). The focus of the meeting was to evaluate alternative survey design options that extend the sampling distribution of the longline survey into areas and depths not currently well represented and to review strategies for transitioning to a new survey and implications for the assessment model. Participation in this meeting included DFO Science and Resource Management, First Nation communities, fishing industry, and non-DFO scientists.

The DFO-Industry Atlantic Halibut Longline Survey provides an index of abundance in the statistical catch-at-length stock assessment model that is used in framework assessments every five years and as a key input to the interim procedures used to derive annual Total Allowable Catch (TAC) advice in the intervening years. The Atlantic Halibut Longline Survey began in 1998 and has been modified in the intervening years. It was last modified in the mid-2000s. The need to redesign the survey was identified in the 2014 Assessment Framework.

The meeting was reconvened on March 9, 2017, to present additional information and analysis on the survey design options.

This proceedings document includes a summary of the presentation and is the record of the meeting discussions and conclusions. A Research Document resulting from this meeting will be published on the Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat's (CSAS) Website as it becomes available.

Compte rendu de l'examen régional par les pairs sur la conception du relevé du flétan de l'Atlantique à la palangre du Pêches et Océans Canada (MPO) et de l'industrie

SOMMAIRE

Un examen régional par les pairs a eu lieu le 17 février 2017, à l'Institut océanographique de Bedford, à Dartmouth (Nouvelle-Écosse), afin d'examiner la conception du relevé du flétan de l'Atlantique à la palangre du MPO et de l'industrie pour l'unité de gestion de la plate-forme Néo-Écossaise et du sud des Grands Bancs (division 3NOPs4VWX5Zc de l'Organisation des pêches de l'Atlantique nord-ouest [OPANO]). La réunion visait à évaluer d'autres options de conception des relevés qui étendent la distribution de l'échantillonnage du relevé à la palangre jusque dans les zones et les profondeurs qui ne sont pas bien représentées actuellement, et à examiner des stratégies concernant la transition vers un nouveau relevé et les incidences sur le modèle d'évaluation. Les participants à cette réunion comprenaient le Secteur des sciences et la Gestion des ressources du MPO, des Premières Nations, l'industrie de la pêche ainsi que des scientifiques qui ne travaillent pas pour le MPO.

Le relevé du flétan de l'Atlantique à la palangre du MPO et de l'industrie fournit un indice d'abondance dans le modèle d'évaluation statistique détaillé des prises selon la longueur qui est utilisé dans les évaluations-cadres tous les cinq ans, et est un élément essentiel des procédures temporaires utilisées pour obtenir un avis sur le total autorisé des captures (TAC) dans les années d'intervalle. Le relevé du flétan de l'Atlantique à la palangre a été lancé en 1998, et a été modifié dans les années d'intervalle. Sa dernière modification remonte au milieu des années 2000. La nécessité de revoir la conception du relevé a été cernée dans le cadre d'évaluation de 2014.

On a convoqué les participants de nouveau le 9 mars 2017 afin de présenter des renseignements supplémentaires et des analyses sur les options de conception des relevés.

Le présent document inclut un résumé de la présentation et est un compte rendu des discussions et des conclusions de la réunion. Un document de recherche découlant de cette réunion sera publié sur le site Web du Secrétariat canadien de consultation scientifique lorsqu'il sera disponible.

INTRODUCTION

The Atlantic Halibut Longline Fixed Station Survey began in 1998 with the objective of developing an index of abundance for the exploitable halibut population on the Scotian Shelf and Grand Banks (Zwanenberg and Wilson 2000). The longline survey is critical to the current management approach used for Atlantic Halibut on the Scotian Shelf and Grand Banks. It is used both as an index of abundance in the statistical catch-at-length stock assessment model and as the index of exploitable biomass upon which annual Total Allowable Catch (TAC) advice in the interim years between framework stock assessments is based.

The original survey was a stratified random design, with strata defined using areas of low, medium, and high commercial Atlantic Halibut landings Catch Per Unit Effort (CPUE) between 1995 and 1997 (Zwanenberg et al. 2003), but was modified to a fixed station design to facilitate implementation. The survey was last modified in the mid-2000s with stations rearranged and added to achieve better coverage in the Bay of Fundy, Cape Breton, and Georges Bank (Trzcinski et al. 2011). The need to improve and expand the survey was identified during the 2014 DFO Science peer review of the Framework (DFO 2015). The overarching goal of the survey is to provide a simple cost-effect index of large Atlantic Halibut biomass throughout the management unit.

As part of the Regional Peer Review process, a meeting was held on February 17, 2017, at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia, to review the design of the DFO-Industry Atlantic Halibut Longline Survey.

The meeting Chairperson, Tana Worcester, introduced herself, followed by an introduction of meeting participants (Appendix 1). The Chair thanked meeting participants for attending the DFO Regional Peer Review Process. The Chair provided a brief overview of the Canadian Science Advisory Secretariat (CSAS) peer review process and invited participants to review the meeting Terms of Reference (Appendix 2) and Agenda (Appendix 3). This Proceedings report is the record of the discussion of the meeting.

To guide discussions, a working paper had been prepared, which would be produced as a Research Document upon acceptance. A Science Advisory Report (SAR) would not be produced as a result of this meeting.

A follow-up meeting was held March 9, 2017, to review additional information and analysis presented on the survey design options.

PRESENTATIONS AND DISCUSSION (FEBRUARY 17, 2017)

HALIBUT SURVEY OVERVIEW (NAFO DIVS. 3NOPS4VWX5ZC)

Presenter: N. den Heyer
Rapporteur: T. Worcester

Presentation Summary

Scotian Shelf and Southern Grand Banks (NAFO Divs. 3NOPs4VWX5Zc) Atlantic Halibut is managed on a multi-year assessment program, with the last DFO Science peer reviewed framework meeting occurring in 2014. At that time, the Atlantic Halibut Longline Survey provided one of two fishery-independent indices of abundance in the assessment model, with the 3-yr mean standardized catch rate of the Atlantic Halibut Longline Survey adopted as the index of abundance for interim assessment updates that provide TAC advice.

The Atlantic Halibut Longline Survey, which is a DFO-Industry collaboration, provides an index of exploitable halibut abundance and complements the DFO RV trawl survey, which captures smaller halibut. The survey began in 1998 as a stratified random survey with stratification based on the 1995-1997 commercial fishing CPUE and station allocation was a 5:7:10 ratio of low:medium:high CPUE. The fixed station allocation was reviewed in the early 2000s and new stations were added to expand coverage in the Bay of Fundy and NAFO Division 4V. The number of fished stations and survey captains has been fairly stable since 2006. The survey protocols, established in 1998, specified that 1000 size 14 or greater hooks would be set between 4 am and noon with a soak time of 10 hours. Data on catch, fishing protocol, and fish morphology from the fixed station sets are collected by at-sea observers.

Halibut abundance has been increasing since the early 2000s. With increasing abundance, changes in range and distribution are expected. The current survey design, based on CPUE of the commercial fishery in the 1990s, may not be sufficient to capture such changes. This along with potential changes in fishing gear and bait, which were not defined in the fishing protocols, would affect the standardization of catch rates.

In 2016, a review of the survey was completed to improve the statistical model to standardize the catch rate and make recommendations on an improved survey design. This review recommended greater standardization of fishing protocols, the collection of additional data on hook occupancy to be used in a new model to standardize the catch rates, and also suggested a re-allocation of survey stations to improve the precision of the index of abundance using the same stratification scheme and number of stations.

Discussion

There was a short discussion on the mixing of Atlantic Halibut stocks between NAFO Divisions 4Vn and 3Pn, with a meeting participant noting that information regarding stock mixing is not included in the working paper. It was clarified that the survey redesign did not consider spatial differences in size composition or movement patterns and will not address mixing of Atlantic Halibut within or across the management unit boundaries. A preliminary analysis of tagging data from den Heyer et al. (2012) suggests limited mixing occurs, with limited movement between NAFO management units and more than half the tags recaptured within 30 km of release.

SCOTIAN SHELF AND SOUTHERN GRAND BANKS (NAFO DIVS. 3NOP4VWX5ZC) ATLANTIC HALIBUT LONGLINE SURVEY DESIGN

Presenter: S. Cox
Rapporteur: T. Worcester

Presentation Summary

This presentation examines changes to the survey design, including the stratification scheme and allocation, to improve the fishery-independent index of abundance of for Scotian Shelf and southern Grand Banks (3NOPs4VWX+5Zc) Atlantic Halibut. Three alternative stratification schemes were evaluated and presented (four areas and two depths; four areas and three depths; five areas and two depths). Specifically, design options that extend sampling into areas and depths not well sampled by current design are considered. A transition plan that will enable a cost-effective introduction of a new survey design while providing an index of abundance for the provision of TAC advice and an opportunity to calibrate the two surveys, is also evaluated.

Discussion

Survey Design Options

It was asked if additional species (i.e., cusk) would be included in the survey design. It was noted that the survey would focus on Atlantic Halibut, and other species would not be considered as part of this survey redesign.

The approach used to stratify the area and the rationale for the proposed stratification was discussed. Meeting participants questioned what was achieved through the alternative stratification schemes and whether increased consistency within the strata is achieved with the proposed approach. The two goals of the stratification were reiterated: to increase spatial coverage of the survey and ensure high annual survey precision. It is useful to achieve a coefficient of variation (CV) less than 20% since a CV above 30% is not useful in a stock assessment. It was suggested that a more thorough explanation of the rationale for the stratification (i.e., the use of NAFO Divisions) was needed and that there should be an analysis or consideration as to whether there would be any scientific benefit to using a different stratification scheme. It was noted that it is logistically easier to stratify the survey by NAFO units and that the necessary data was not available for meeting participants to evaluate the stratification schemes.

Participants expressed concern that the proposed survey design does not cover the full range of Atlantic Halibut within the stock unit since the current index of abundance is based on a survey that only covers NAFO Divisions 4VWX. In particular, there was concern that if there are changes in distribution (either increased numbers in the core areas or an expansion of the species' distribution into new areas) the survey index would not be representative of the stock. The presented area-based allocation options, which results in a reduction of sampling effort in 4X5YZ and 4W and increased efforts in 3NOP, are expected to result in an increased sampling coverage of the stock. To ensure the full stock area is covered, there have been previous discussions concerning the expansion of the survey into NAFO Division 3NOP with industry and the purpose of this meeting, to discuss the allocation of sets across this broader area, was reiterated.

Under the proposed stratification approach, participants expressed concerns with areas of interest, particularly 4Vn, being excluded during randomized site selection. It was proposed that 4Vn be separated from 4Vs into its own strata to ensure that sets from this area are included in the survey. This proposal may provide greater industry confidence that the area is well sampled and provide data to inform questions about the stock's relationship to the adjacent Gulf of St. Lawrence stocks; however, this would be a less efficient stratification as more stations would be needed to ensure full coverage and it would reduce the number of data points for analysis of historical CVs. Further, if the proposal was to have smaller strata, it may be optimal to divide 4Vn differently. It was decided to continue with scheme based on NAFO stratification with 4Vn and 4Vs, included in a single strata.

There was a discussion on the inclusion of 3Pn in the survey design presented to meeting participants. 3Pn is not part of the management unit but is adjacent to the Southern Grand Banks and Scotian Shelf management unit. Including 3Pn in the survey design would provide flexibility should this area be assigned to the Southern Grand Banks and Scotian Shelf stock unit. A decision regarding the inclusion of data in the stock assessment can be made at a later date, if the data is collected. It was noted that there may be logistical reasons that prevent sampling and that sampling within the area may build an unfounded expectation that the fishery in the area would be managed under similar constraints as the 3NOPs4VWX+5Zc management unit.

During the discussion of allocation options, it was noted that under an area-based sampling approach, survey stations are allocated proportionally to the size of the strata. A review of the spatial information from the commercial index indicated that the distribution of the landings among NAFO areas had changed very little since in the last 40 years. The location of the survey sites was discussed with meeting participants asking why stations are mapped in areas where Halibut cannot be fished and whether stations should be added to fished areas that are not part of the current survey.

It was acknowledged that the sampling of stations in close proximity to one another could result in spatial correlation while dividing an area into a large number of strata increases the likelihood of having an insufficient amount of data for analysis. To account for spatial correlation during the allocation of survey sites, it was recommended that survey sites be separated as much as possible, with the use of a minimum distance between stations being suggested. Several options included using a random starting point with a fixed grid, a minimum distance rule in the randomization selection procedure, or implementing a buffer around selected sites when using a GIS selection method were discussed. A block design was favoured among meeting participants.

The sample size of the proposed survey design was discussed. Using an area-based allocation method, it was recommended that 150 stations be included in the new survey design with meeting participants agreeing that the number of stations seemed feasible. A meeting participant noted that it seemed contradictory to be recommending a reduction in sampling intensity while expanding the geographic distribution of the survey. It was asked whether 250 stations, which is closer to the number of stations in the current survey, would be more appropriate. Additional information on using 150 or 250 stations is needed and discussions of the risks of selecting 150 or 250 stations were recommended.

Whether 150 survey stations would be sufficient if CPUE decreases was also discussed. With the increase in abundance, since the mid-2000s, there has been decrease in the proportion of empty sets. At points of low abundance, there is an increase in the number of empty sets that will influence the CV; however, even if the stock was low, the same number of sets might still be sufficient.

It was noted that if there are good CVs for all areas, it may be possible to derive biomass estimate for the different areas, which was not previously possible.

A meeting participant noted that there will need to be a plan developed when a selected station cannot be achieved. Two alternate locations for each random set will be provided and a plan to address stations that cannot be fished will be developed during subsequent discussion between industry and DFO.

It was asked whether the survey redesign will help address the timing of the survey in relation to climate change. Different signals may be seen in other areas; however, the intention is to continue sampling at the same time.

Transition Strategies to a New Survey

The transition from the current survey to the new survey was discussed. It was proposed that during the transition, the current survey be completed in addition to 100 randomly stratified stations. This approach may have higher up-front costs but would be less expensive in the long term. Conducting two surveys simultaneously may help with understanding the impact of the different survey protocols, as fishing may be occurring with different protocols in nearby locations.

The method to select the 100 stations from the current survey stations was discussed. It was suggested that one approach would be to select the 100 stations that minimize the impact on the difference between the new index and the old index. It was also suggested that the assessment model should be rerun with each removed station, although it was noted that there is not time available to do this. One suggestion was to keep removing stations until it results in a TAC change outside the 15%. Another approach would be to use the 100 stations that have been sampled consistently over time.

There was a request to develop a 5-year plan of station allocations to assist with the cost analysis.

There was a discussion on the total number of stations that could be sampled annually for a five year period. There was a suggestion that 230 stations, which is similar to the number of stations currently sampled, was plausible while 300 stations was also suggested as feasible. The cost of running 2 surveys simultaneously is expected to be higher than the current survey since 2 survey protocols will be implemented over an expanded area that will have a lower density of stations. Currently, there are sites where 2 to 3 sets can be completed per day; however, under a random survey design, there might be fewer of these opportunities. The distance between sampling location is variable given the random distribution of sampling locations among strata and will affect the number of sets that can be achieved per day. Cost does not decrease linearly with distance as there are efficiencies that can be utilized. Between the 3 stratification options, the difference in mean distance is 1-2 km. In addition to distance between stations, there are a number of additional factors, such as speed and soak time that influence the number of sets that can be completed per day.

Alternate strategies for subsampling across the area were discussed. There was an inquiry as to whether an algorithm, which could analyze each station and determine which has the least impact on cost, could be developed. It was suggested that each station should have a cost associated with sampling it and then the feasible number of stations would be dependent on the available budget. Estimating the cost associated with sampling each station would not be a straight forward calculation, although a rough estimate may be possible.

There was a suggestion to use a spatial clustering approach, with consideration of costs but minimizing the spatial correlation. It was also suggested that the number of stations in NAFO Division 4X be reduced from the current 143 stations, with those stations added to another location.

Procedures for setting annual TACs during the transition period were discussed. There are 57 "Golden" stations in the fixed-station survey that have been regularly surveyed from 1998-2015. Using the 3-year running mean, a comparison of time series of TACs generated using the Halibut survey Generalized Linear Model (GLM) index with those generated using the Golden 57 station index suggests the Golden 57 stations can be used as a reliable index for establishing TACs during the transition period. A meeting participant asked why none of the 57 stations are in 4Vn. These stations were identified by having been fished most consistently and with specific hook size and protocols. There were no stations in 4Vn that met the criteria.

There was also a discussion about the appropriate block size and potentially increasing it from the proposed 4 km x 4 km blocks. It was suggested that smaller blocks may be used in areas with deeper water.

The BC Sable fish stock assessment model was presented to illustrate how catchability estimates (q) are affected during the transition period and the number of years that both surveys should run simultaneously was discussed. It was suggested that a calibration period less than 3 years was not feasible since the harvest control rule for Atlantic Halibut uses a 3-year moving

average of the survey. If the new survey is implemented as planned in 2017, 2 to 3 years of data collected from the new survey would be available for analysis during the next framework. There would still be a continuous recruitment index to anchor the biomass estimate, so it is not a complete change in survey. It was clarified data from the new survey would not be used to set quota until after the next framework meeting.

There was a discussion on the role of the commercial index sets and the collection of length composition data from the survey. It was noted that most fishers do not fish commercial sets while fishing stations in the fixed survey. It was confirmed that the proposal is to still collect size and length composition data. Catch composition data will be used from the commercial index to ensure this data is consistent with the data from the full survey.

There was consensus among meeting participants that the 2 surveys would run simultaneously for 3 years. The new survey will consist of 150 randomly stratified stations (across five areas, 3 depths: 15 strata). During the transition period, 100 stations from the current survey should continue to be sampled using the current protocols.

It was decided that a follow-up meeting would be required, at which time the following would be presented: maps and information required to execute the new survey (location of the 150 stations); and information about the transition plan (location of the reduced current survey to 100 stations).

PRESENTATIONS AND DISCUSSION (MARCH 9, 2017)

SCOTIAN SHELF AND SOUTHERN GRAND BANKS (NAFO DIVS. 3NOP4VWX5ZC) ATLANTIC HALIBUT LONGLINE SURVEY DESIGN: ADDITIONAL ANALYSIS

Presenter: S. Cox
Rapporteur: J. MacDonald

Presentation Summary

Maps of the survey station locations for the next 5 years were presented. For the new survey, each of the 150 stations includes an option 'a', 'b', and 'c' alternatives. These alternatives are to be used if sampling is not possible in one location. The size of the survey blocks are 4 km x 4 km (26,000 blocks).

Discussion

New Survey Design

There was discussion on the criteria for determining fishable areas and when it is appropriate to use an alternate location. For example, it may not be possible to fish at a station, if there are draggers fishing in the area. For each survey station, fishers would be provided with three randomly selected options (options a, b, and c). If option 'a' was located in a non-fishable area, the option 'b' station would be selected. Participants asked whether areas with undersea cables or other equipment would be considered non-fishable. It was noted that survey coordinators will have the opportunity to work with industry to determine which sites are fishable.

Meeting participants agreed that the following areas are considered non-fishable: areas closed to fishing, the furthest point in the northeast corner of Area 5, and French waters associated with the St. Pierre and Miquelon Exclusive Economic Zone. New maps will be produced that exclude these areas from the survey station allocation.

There was a significant discussion on the inclusion of 3Pn in the survey design with the concern the survey will influence the TAC allocations in 3Pn raised by meeting participants. Surveying 3Pn does not imply management changes for the area as it is currently unknown with which stock Atlantic Halibut in 3Pn are affiliated. Surveying may provide information to assist in determining stock structure. Ideally, 3Pn will be covered by both the Maritimes and Gulf surveys until the stock structure can be determined, as it would be more challenging to add 3Pn to the survey design at a later date. If, after three years of the survey, it is determined that 3Pn Halibut are not part of the stock, the data can be removed from the assessment model.

There was a concern that NAFO Divisions 4Vn and 4Vs are treated as the same area in the survey design despite being two different divisions with different fisheries. The random design of the survey will result in proportional allocations to 4Vn and 4Vs; however, in any given year there may be proportionally more stations in 4Vn or 4Vs.

It was acknowledged that unlike the fixed station survey, the random survey design does have additional logistical challenges. It will be important to ensure consistency in the implementation of sampling protocols. It was noted that the logistics concerning survey implementation will be discussed at a subsequent industry meeting scheduled for March 14, 2017. During that meeting, questions and concerns for determining fishable areas, how to fish 'in the box' and how stations will be coordinated if they don't match the location where fishing is occurring will be addressed.

Subset of Current Survey Stations for the Transition Period

The assessment model was run to evaluate options to select a subset of the current survey stations to be used during the transition period. Three options were presented: Freq100 (57 golden stations + 43 next most frequently fished stations); Freq150 (57 golden stations + 93 next most frequently fished stations); and Opt 150 (57 golden stations and 93 stations allocated to NAFOR are to achieve proportions suggested by Smith (2016). Modelling results suggest that the Freq100 and Freq150 options provide the closest abundance estimate to the current survey, with Freq150 having less variability than Freq100. The 57 golden stations and Opt150 also provide adequate abundance estimates; however, differences in TAC allocations were noted.

It was suggested by the Science lead that 150 fixed stations most frequently sampled (Freq150) be used during the transition period. It was requested that the Research Document include information for both the Freq100 and Freq150 stations. As both options provide similar estimates, it was suggested that additional discussions between Fisheries Management and Industry should occur before a decision regarding the number of stations is made as there are other considerations, such as cost, which would influence station selection during the transition period.

It was noted that the fishery is currently in a period of high abundance. If stations are removed, there is a risk of having low length compositions for the survey. It was asked whether an easy method of comparing length compositions between Freq100 and the current 238 stations could be developed. A simple or easy test may provide an irrelevant answer, as a test and the model will incorporate the same data differently. It was suggested that this issue be examined over the upcoming year. To address questions concerning length composition, it was suggested that data be run through the Statistical Catch-at-Length (SCAL) model. Incorporating length composition data in the model may provide reassurance with the use of Freq100 stations. It was noted that modeling can be done without the length frequency and the calibration of the model would not be impacted.

A meeting participant noted that it was preferable to have a lower sample size that better reflects the stock and not to sacrifice survey design for sample size.

The need to address the mixing of the two stocks was raised by a meeting participant. The station allocation is moving further from where the mixing occurs, which will limit the ability to address these outstanding questions.

It was concluded that the additional information presented at this meeting will be added to the Research Document.

Overall, participants agreed to move forward with: (1) a new survey design that is a random allocation across 5 areas and 3 depths; (2) allocations that are area-based; and (3) evaluate survey allocations in 3 years to address the prevalence of empty sets and improve cost effectiveness. During the transition period, the new 150 random stations should be sampled in addition to the 100 or 150 of the fixed stations. It was also agreed that there is a need to establish standardized protocols for the new survey.

DOCUMENTS

There was consensus that Cox et al. (WP 2017/02) should be published as a Research Document. A Science Advisory Report (SAR) will not be produced. All meeting products will be published on the Fisheries and Oceans Canada (DFO) Canadian Science Advisory Secretariat's (CSAS) Website as they become available.

This Proceedings Document constitutes the record of meeting discussions, recommendations, and conclusions.

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APPENDICES

APPENDIX 1: LIST OF MEETING PARTICIPANTS

February 17, 2017

Name	Affiliation
Baker, Lori	Eastern Shore Fisherman's Protective Assn. (ESFPA)
Bennett, Lottie	DFO Maritimes / Centre for Science Advice
Cadigan, Noel	MUN Marine Institute / CFER
Carruthers, Erin	Fish, Food and Allied Workers
Clark, Don	DFO Maritimes / Population Ecology Division (BIO)
Coffin, David	DFO Newfoundland / Resource Management
Courtney, Robert	North of Smokey-Inverness South Fishermen's Assn (NOSFA)
Cox, Sean	Contractor
den Heyer, Nell	DFO Maritimes / Population Ecology Division (BIO)
Desgagnes, Mathieu	DFO Québec / Science (IML)
Ford, Jennifer	DFO Maritimes / Resource Management
LeBlanc, Paul	DFO Maritimes / Population Ecology Division (BIO)
Mood, Natasha	Mood Fisheries Ltd.
Nicholas, Hubert	Membertou First Nation / Fisheries
Sherwood, Ray	4VN Management Board
Vascotto, Kris	Atlantic Halibut Council / Groundfish Enterprise Allocation Council (GEAC) / Vascotto Resource Services Inc.
Worcester, Tana	DFO Maritimes / Centre for Science Advice

March 9, 2017

Name	Affiliation
Bennett, Lottie	DFO Maritimes / Centre for Science Advice
Cadigan, Noel	MUN Marine Institute / CFER
Carruthers, Erin	Fish, Food and Allied Workers
Coffin, David	DFO Newfoundland / Resource Management
Courtney, Robert	North of Smokey-Inverness South Fishermen's Assn (NOSFA)
Cox, Sean	Contractor
den Heyer, Nell	DFO Maritimes / Population Ecology Division (BIO)
Desgagnes, Mathieu	DFO Québec / Science (IML)
Ford, Jennifer	DFO Maritimes / Resource Management
Leblanc, Paul	DFO Maritimes / Population Ecology Division (BIO)
MacDonald, Jennifer	DFO Maritime / Centre for Science Advice
Mood, Natasha	Mood Fisheries Ltd.
Vascotto, Kris	Atlantic Halibut Council / Groundfish Enterprise Allocation Council (GEAC) / Vascotto Resource Services Inc.
Wilson, Gabrielle	Atlantic Halibut Council

APPENDIX 2: TERMS OF REFERENCE

Review of the Fisheries and Oceans Canada (DFO)-Industry Halibut Longline Survey Design

Regional Advisory Process – Maritimes Region

February 17, 2017
Dartmouth, Nova Scotia

Chairperson: Tana Worcester

Context

The DFO-Industry Atlantic Halibut Longline Survey provides the primary index of exploitable biomass for the Northwest Atlantic Fisheries Organization (NAFO) Divisions 3NOPs4VWX5Zc Atlantic Halibut stock assessment as well as the index of abundance for NAFO Divs. 4VWX5Z Cusk. In interim assessment years, NAFO Divs. 3NOPs4VWX5Zc Atlantic Halibut Total Allowable Catch (TAC) advice is based the q-adjusted 3-year mean of the Atlantic Halibut survey Generalized Linear Model (GLM) index. The survey is also a platform for science work including Atlantic Halibut all sizes tagging and collection of length and sex composition data, otoliths and maturity sampling.

The need to redesign the Atlantic Halibut Longline Survey was identified in the 2014 assessment Framework (DFO 2017). The survey was last modified in the mid-2000s, with the addition of stations in under-sampled areas in NAFO Subdivision 4Vn and Bay of Fundy. A preliminary investigation of the current survey design was in 2016 (Smith 2016). That review focused on the survey GLM index and recommended an alternative hook competition model. Landmark Fisheries Research has been contracted to redesign the DFO/Industry Atlantic Halibut survey for the NAFO Divs. 3NOPs4VWX5Zc stock to improve the index of abundance.

Objectives

The objective of the Science Advisory Process is to evaluate:

- alternative stratified random survey design options that extend the sampling distribution of the longline survey into areas and depths that are not well represented by the current survey, and
- alternative strategies for the transition to a new survey and implications for the assessment model.

Expected Publications

- Proceedings
- Research Document

Expected Participation

- DFO Science
- DFO Fisheries and Aquaculture Management
- Industry
- Academia
- Aboriginal Communities/Organizations
- FSC License Holders

References

DFO. 2017. Proceedings of the Regional Framework Discussion on Stock Substructure of Northwest Atlantic Fisheries Organization (NAFO) Divisions 3NOPs4VWX5Zc Atlantic Halibut, *Hippoglossus hippoglossus* (Scotian Shelf and Southern Grand Banks); March 9-11, 2016. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2017/010.

Smith, S.J. 2016. Review of the Atlantic Halibut Longline Survey Index of Exploitable Biomass. Can. Tech. Rep. Aquat. Sci. 3180: v + 56

APPENDIX 3: MEETING AGENDA

Redesign of DFO-Industry Atlantic Halibut Survey

Regional Peer Review – Maritimes Region

17 February 2017

Gully Boardroom
Bedford Institute of Oceanography
Dartmouth, Nova Scotia

Chairperson: Tana Worcester

Draft Agenda

Time	Topic	Presenter
9:00 - 9:30	Welcome and Introductions	T. Worcester
9:30 - 10:00	Overview of Current Survey Design	N. den Heyer
10:00 - 10:30	Survey Design Options: Methods	S.P. Cox
10:30 - 10:45	Break (coffee/tea provided)	
10:45 - 12:00	Alternative Survey Design Options	S.P. Cox
12:00 - 1:00	Lunch (hospitality not provided)	
1:00 - 2:30	Transition Strategies to a New survey	S.P. Cox
2:30 - 2:45	Break (hospitality not provided)	
2:45 - 4:30	Implications for the Assessment Model	S.P. Cox
4:30 - 4:45	Wrap Up	T. Worcester